

FLOOD CONSEQUENCES ASSESSMENT

4 BROOK STREET, WREXHAM

SEPTEMBER 2010



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Report Title : Flood Consequences Assessment
: 4 Brook Street, Wrexham
Client : Lingar Properties
Report Status : Final
Date of Issue : 29 September 2010

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1 INTRODUCTION

Weetwood has been instructed by Lingar Properties to undertake a Flood Consequences Assessment (FCA) for the proposed redevelopment of 4 Brook Street, Wrexham, in accordance with the requirements of Technical Advice Note 15 (TAN15): Development and Flood Risk.

1.1 SITE LOCATION

The site is located at Ordnance Survey National Grid Reference SJ 333 501, as shown in **Figure 1** and is bordered by Brook Street to the north and Bridge Street to the east.

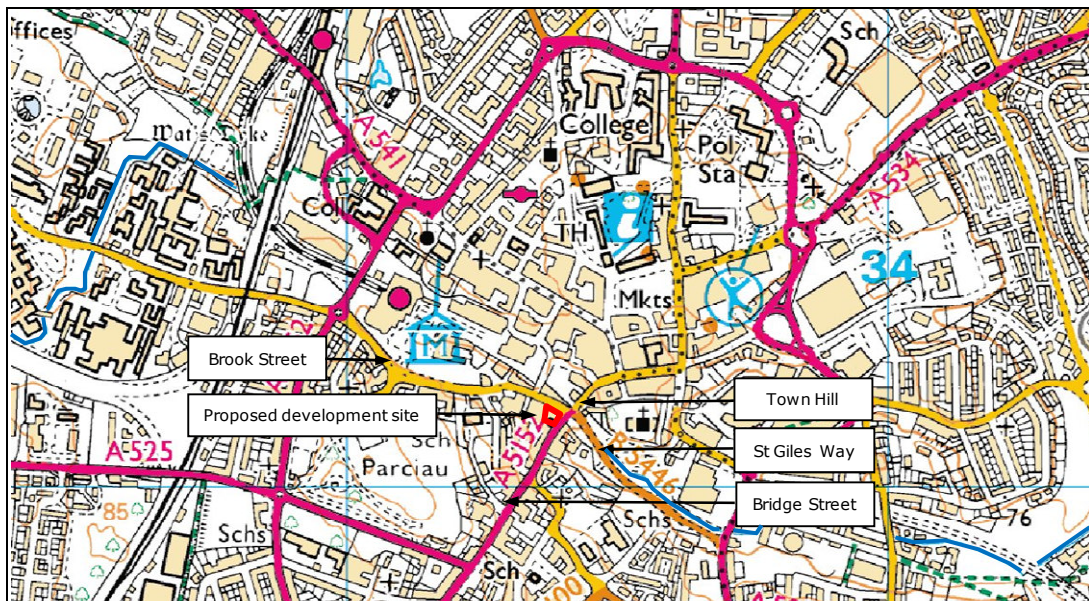


Image reproduced with permission of Ordnance Survey and Ordnance Survey of Northern Ireland

Figure 1: Site Location

1.2 EXISTING AND PROPOSED DEVELOPMENT

The site is currently occupied by an existing building which was previously utilised as a nightclub.

Proposals are for the redevelopment of the existing building, with a nightclub retained within the basement and a total of 27 flats (to be used for student accommodation) provided on the ground, first and second floors (**Appendix A**).

Residential development is classified as '*highly vulnerable development*' under TAN15, whilst EAW have advised¹ that nightclubs should be classified as '*less vulnerable development*'.

1.3 SITE LEVELS

A topographic survey of the site has been undertaken by Cheshire Surveys and is provided in **Appendix B**. Site levels are shown to be in the region of 75.23 to 75.99 metres Above Ordnance Datum (m AOD).

¹ Letter from EAW dated 1 September 2010 (EAW ref: NT/2010/111495/01-L01)

Ground floor finished floor levels of the existing building are currently shown to be set at 76.02m AOD.

1.4 ACCESS AND EGRESS

Access and egress to the site is provided directly off Brook Street to the north and Bridge Street to the east.

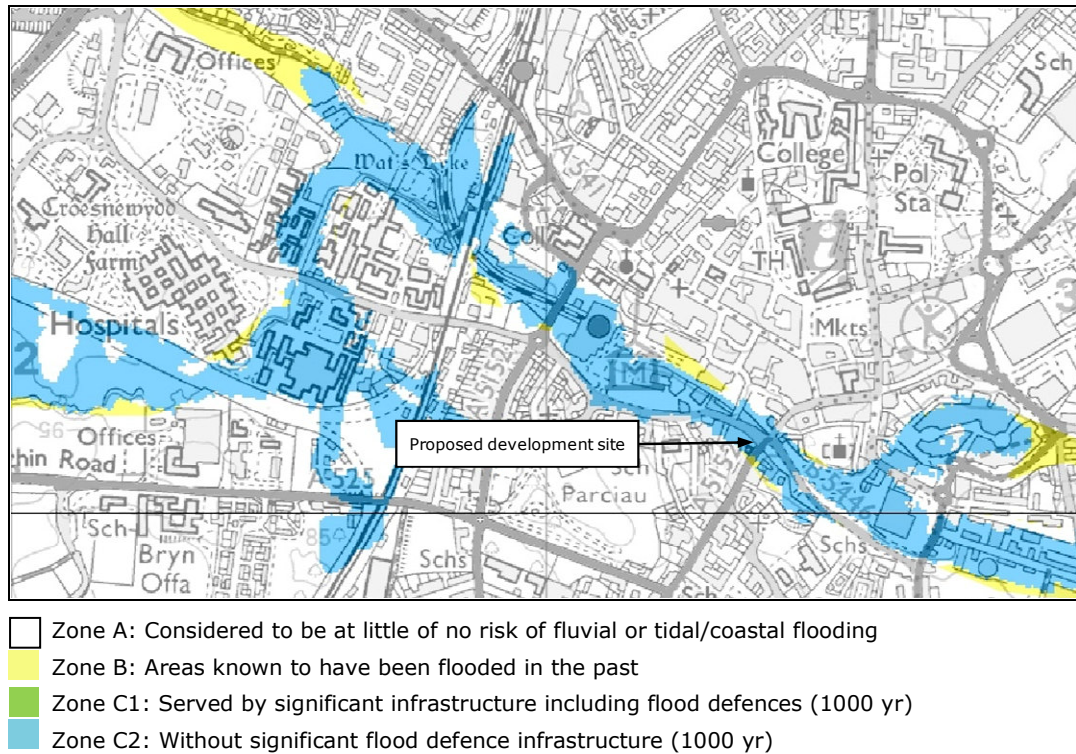
Levels along Brook Street are shown to rise in an easterly direction towards its junction with Bridge Street and are generally in the region of 74.80 to 75.76m AOD. Bridge Street is in turn shown to rise in a southerly direction from 75.80 to 75.90m AOD.

Levels at the junction of Brook Street, Bridge Street, St Giles Way and Town Hill are shown to be in the region of 75.77 to 75.97m AOD.

2 TECHNICAL ADVICE NOTE 15 (TAN15)

2.1 DEVELOPMENT ADVICE MAP

The Welsh Assembly Government's Development Advice Maps are used for planning purposes associated with the use of TAN15. According to the latest Development Advice Map, the site is located within Zone C2 (**Figure 2**).



Welsh Assembly Government, 100017916, 2009

Figure 2: Development Advice Map

2.2 ENVIRONMENT AGENCY WALES FLOOD MAP

According to EAW's latest flood map for this area (**Figure 3**) the site lies partially within the 1 in 1000 year flood outline. This therefore appears to confirm the site's Zone C2 classification under TAN15.

However, the flood outline as illustrated in **Figure 3** is shown to differ significantly from that indicated on the Development Advice Map (**Figure 2**). Further clarification regarding the site's flood zone designation has therefore been sought from EAW as discussed in **Section 2.3**.

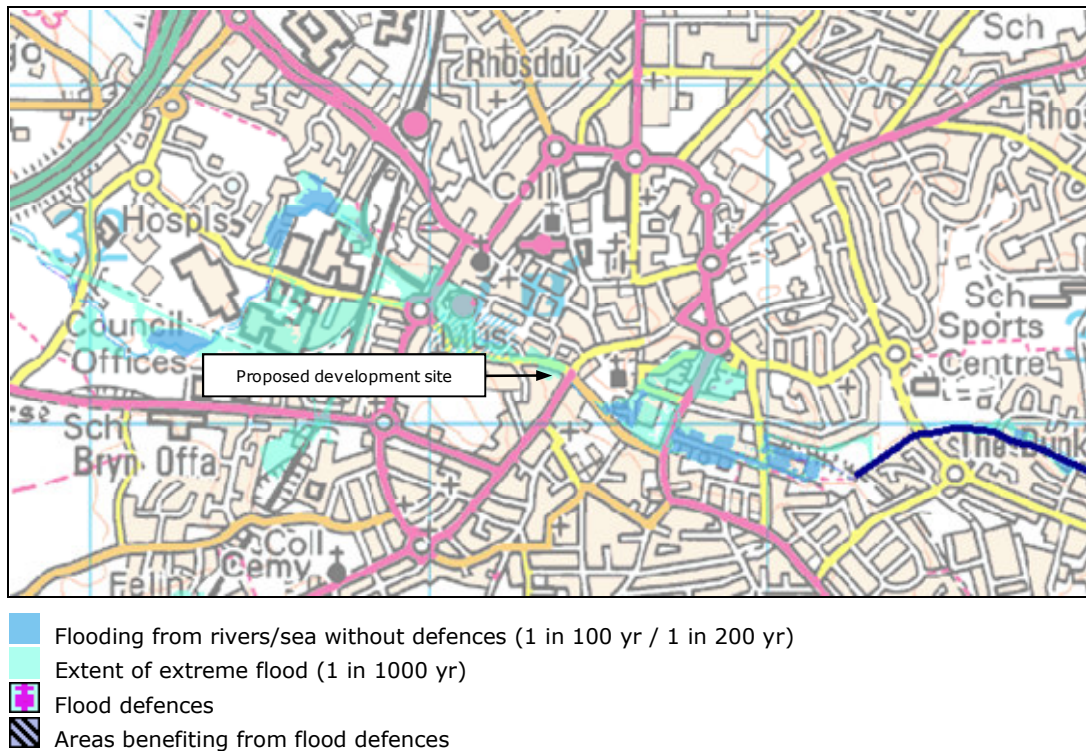


Figure 3: Environment Agency Wales Flood Map

2.3 FLOOD ZONE DESIGNATION

EAW have confirmed² that the Zone C2 classification indicated on the Development Advice Map follows an older flood outline, which has been superseded by more recent modelling of the Afon Gwenfro undertaken by JBA Consulting in 2009³. The most up-to-date flood outline is as illustrated on EAW's flood map (**Figure 3**) with a more detailed map provided in **Figure 4**.

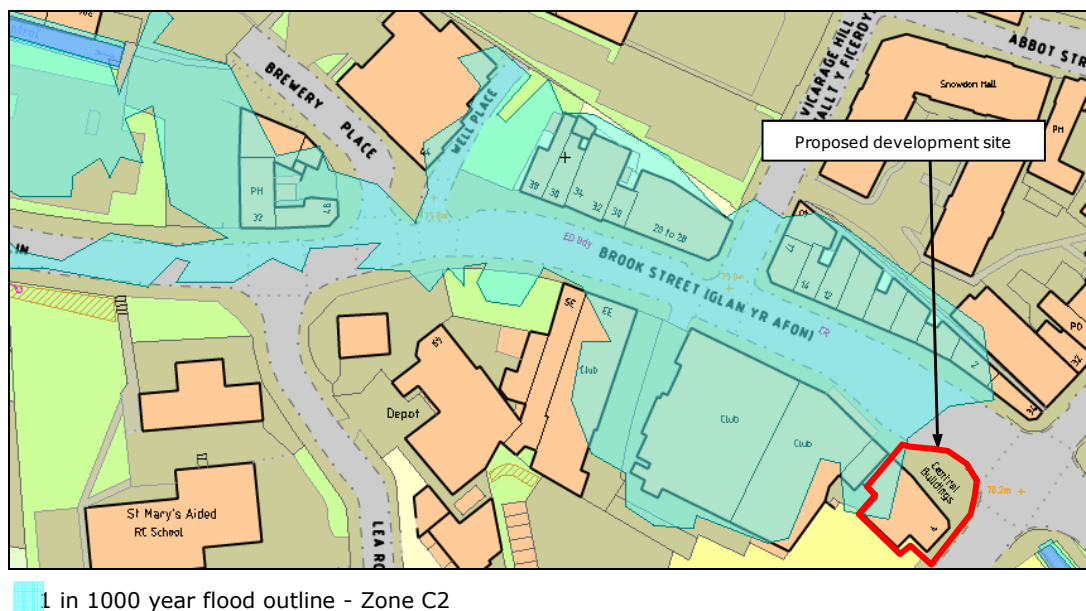


Figure 4: Environment Agency Wales Detailed Flood Map

² Footnote 1

³ Afon Gwenfro Flood Risk Mapping Study, February 2009, JBA Consulting
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Figure 4 suggests that the site should be reclassified as being located predominately within Zone A with a small proportion of the western boundary within Zone C2.

Zone A is an area of land considered to be at little or no risk of fluvial flooding.

Zone C is based on Environment Agency Wales's (EAW) extreme flood outline, equal to or greater than 0.1%, assuming that no defences exist. Zone C2 is an area of the floodplain without significant flood defence infrastructure.

3 FLOOD RISK

3.1 AFON GWENFRO

The Afon Gwenfro flows in a predominately south-easterly direction within the vicinity of the site. The watercourse is culverted approximately 0.19km upstream of the site flowing in culvert through the northerly portion of the site and re-emerging downstream of Bridge Street adjacent to St Giles Way.

3.1.1 Historical Flood Records

The *Afon Gwenfro Flood Risk Mapping Study* modelling report⁴ states that 'there is a long history of flooding in Wrexham from the Afon Gwenfro'. Flooding is understood to have 'been observed from the left hand bank of the Gwenfro adjacent to St Giles church [to the north-east of the site] although no properties were affected'.

No flooding of the site itself is known to have occurred historically.

3.1.2 Modelled Flood Extents

In February 2009 JBA Consulting published their *Afon Gwenfro Flood Risk Mapping Study* modelling report⁵. An ISIS-TUFLOW model of the Afon Gwenfro was developed as part of this study.

The modelled outputs indicate that no inundation of the site would be expected in up to a 1 in 100 year plus climate change event (**Figure 5**) therefore complying with the requirements of Appendix A1.14 of TAN15.

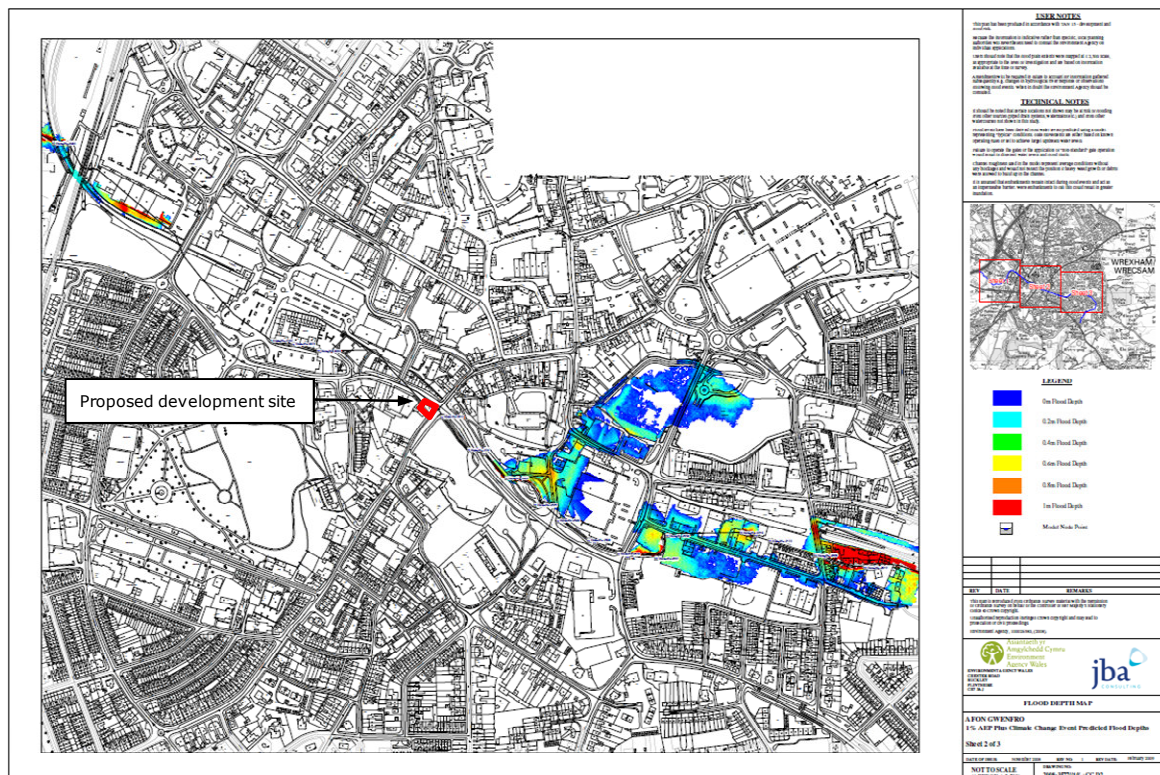


Figure 5: Afon Gwenfro 1 in 100 year plus climate change flood extent

⁴ Footnote 3

⁵ Footnote 3

During a 1 in 1000 year event some partial inundation of the site is shown to occur as illustrated in **Figure 6**.

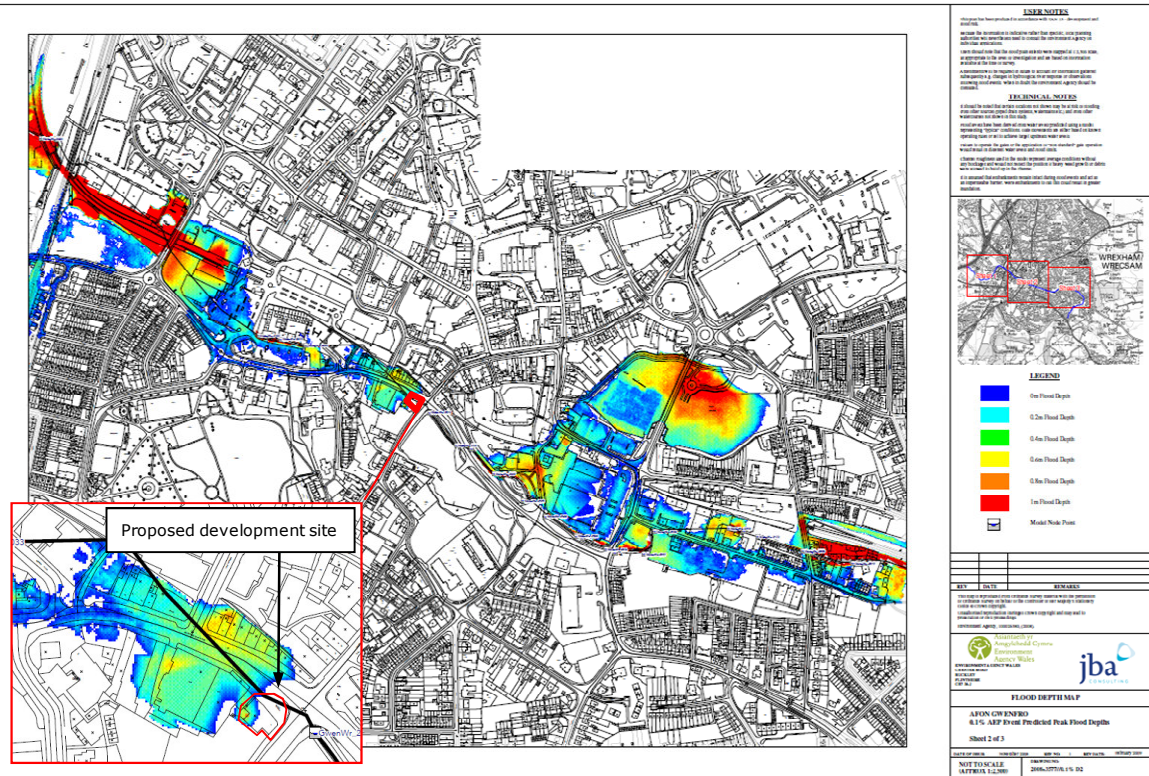


Figure 6: Afon Gwenfro 1 in 1000 year flood extent

This is understood to be as a result of overland flooding originating from the open sections of the channel to the north-west of the site. The *Afon Gwenfro Flood Risk Mapping Study* modelling report states that *'the falling topography along Pentre Felin and Brook Street convey a large proportion of the floodwater through the town until it ponds up immediately before the junction with Bridge Street and Town Hill that is slightly raised'*.

However, the depths and velocities of floodwater expected at the site are given a *'very low hazard'* rating as illustrated in **Figure 7**.



Figure 7: Afon Gwenfro Flood Hazard Rating

No modelled water levels are available for the site. In order to enable a comparison of modelled water levels and floor levels of the existing building the JBA Consulting flood outline (as shown in **Figure 6**) has been overlaid on the topographic survey as shown in **Figure 8**.

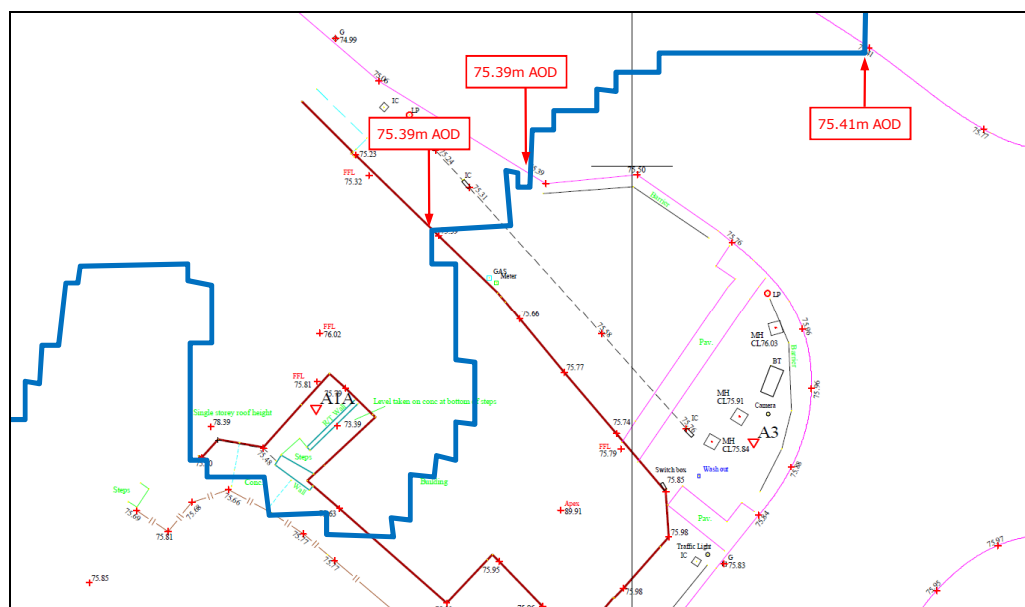


Figure 8: Afon Gwenfro 1 in 1000 year flood extent and water level

Figure 8 suggests that water levels would be expected to pond to a depth in the region of 75.39 and 75.41m AOD on Brook Street during a 1 in 1000 year event.

With ground floor finished floor levels currently set at a level of 76.02m AOD no inundation of this area would be expected during such a scenario.

However, EAW have also raised concern regarding the risk of flooding to the site as a result of the blockage of the existing culverts situated along the length of the River Gwenfro. EAW state that *'the history of flooding in Wrexham from the Gwenfro demonstrates that blockage of culverts has been the primary factor in leading to flooding... [EAW] are not aware of any measures or procedures in place to manage the risk of blockage along this section [of the River Gwenfro]'*. As such EAW indicate that they *'do not consider the flood risk to the site under a blockage to be understood'* or adequately reflected by the modelling work undertaken as part of the JBA Consulting Afon Gwenfro Flood Risk Mapping Study.

EAW suggest that *'under such a scenario pooling of floodwater on Brook Street could be to a significant depth as flows might not return to the channel until levels at the junction of Town Hill, Bridge Street and St Giles Way were exceeded'*.

This residual risk of flooding will be mitigated though implementation of the measures proposed in **Section 4** of this report.

4 FLOOD MITIGATION

4.1 FLOOD MITIGATION

4.1.1 Basement

As discussed in **Section 1.2** the existing building contains a basement, which will continue to be utilised as a night club following redevelopment.

Whilst there will be no change in the vulnerability classification of the basement following redevelopment it may be prudent for flood resilient construction techniques to be incorporated within the design of this area in order to afford some betterment. This should be in line with guidance/principles as set out within the Communities and Local Government Document, '*Improving the Flood Performance of New Buildings: Flood Resilient Construction*⁶ and include design features and finish materials to minimise/reduce the damage in the unlikely event of the development being inundated.

Recognising that proposals are for the redevelopment of an existing building it is not possible for the basement to be made watertight. However, flood resistant construction techniques should be incorporated where feasible and should seek to minimise the entry of floodwater so far as is possible.

4.1.2 Ground Floor

As detailed in **Section 3.1.2** EAW do not consider the flood risk to the site under a blockage scenario to be understood and as such suggest, as a conservative approach, that finished floor levels be set higher than road levels at the junction of Brook Street, Bridge Street, St Giles Way and Town Hill.

As detailed in **Section 1.4** junction levels are currently in the region of 75.77 to 75.97m AOD.

Ground floor finished floor levels are currently set at 76.02m AOD, which is 50 to 250mm above levels at the junction. As proposals are for the redevelopment of an existing building it is not possible for finished floor levels to be raised above existing levels. In order to mitigate any residual risk of flooding as a result of blockage flood resilient construction techniques should be incorporated into the design of the ground floor of the redeveloped building.

4.2 ACCESS AND EGRESS

As detailed in **Section 1.4** access and egress to the site is provided via Brook Street to the north and Bridge Street to the east. Dry access and egress to the site can be provided via both of these routes in up to a 1 in 1000 year event.

4.3 SURFACE WATER

Proposals are for the redevelopment of an existing building. There will be no change in the existing impermeable and permeable surfaces at the site

⁶ Improving the Flood Performance of New Buildings: Flood Resilient Construction. Department for Communities and Local Government. May 2007.

following redevelopment. As such attenuation of surface water runoff is not considered necessary.

5 CONCLUSIONS

There are proposals for the redevelopment of 4 Brook Street, Wrexham to 27 residential flats (to be used as student accommodation) and retaining a nightclub within the basement. According to TAN15 Development Advice Maps the site is located within Zone C2. However, EAW have advised that this has subsequently been superseded by more recent modelling work undertaken by JBA Consulting in 2009. This suggests that the site should be reclassified predominately as Zone A with a small proportion of the western boundary in Zone C2.

An ISIS-TUFLOW model of the Afon Gwenfro has been developed by JBA Consulting as part of the *Afon Gwenfro Flood Risk Mapping Study*. This indicates that, in accordance with the requirements of Appendix A1.14 of TAN15, no inundation of the site would be expected in either a 1 in 100 year or 1 in 100 year plus climate change event. Whilst some inundation of the site is shown to occur in a 1 in 1000 year event, with ground floor finished floor levels of the existing building currently set at 76.02m AOD no inundation of the building would be expected (based upon a comparison of the modelled flood outlines and the topographic survey).

However, EAW have advised that they do not consider the flood risk to the site under a blockage scenario to be adequately understood or reflected by the JBA Consulting modelling work. EAW therefore recommend, as a conservative approach, that finished floor levels be set higher than road levels at the junction of Brook Street, Bridge Street, St Giles Way and Town Hill. Ground floor finished floor levels are currently set at 76.02m AOD, which is 50 to 250mm above levels at the junction. As proposals are for the redevelopment of an existing building it is not possible for ground floor finished floor levels to be raised further. In order to mitigate any residual risk of flooding as a result of blockage flood resilient construction techniques should be incorporated into the design of the ground floor of the redeveloped building.

There will be no change in the vulnerability classification of the basement following redevelopment. However, it may be prudent for flood resilient construction techniques to be incorporated in order to afford some betterment, with flood resistant construction techniques implemented where feasible to minimise the entry of floodwater so far as is possible.

Dry access and egress to the site can be provided via Brook Street to the north and Bridge Street to the east in up to a 1 in 1000 year event.

There will be no change in the existing impermeable and permeable surfaces at the site following redevelopment. As such attenuation of surface water runoff is not considered necessary.

6 RECOMMENDATIONS

This FCA has demonstrated that the proposed development may be completed without conflicting with the requirements of TAN15 subject to the following:

- Ground floor finished floor levels to be set at a minimum of 76.02m AOD
- The latest best practice flood resilient construction techniques to be incorporated into the design of both the ground floor and basement of the building. Flood resistant construction techniques should also be implemented where feasible and should seek to minimise the entry of floodwater so far as is possible.

APPENDICES

APPENDIX A: Development Proposals

APPENDIX B: Topographic Survey